

A CARPENTER'S MAKESHIFT.

A good mechanic will generally have his tools in good order, but through accident or the meddling of some careless or ignorant individual, even a good mechanic may find tools out of order and requiring attention before they can be used.

Our artist the other day sketched a carpenter who, evidently having become tired of a dull saw, resorted to the expedient illustrated. Not having a suitable vise at hand, he inserted his saw back downward in a



AN EXTEMPORIZED SAW VISE.

kerf in the timber on which he was working, and proceeded to file his saw as though it were held in the most approved manner.

A LARGE PUNCHING MACHINE.

The Cockburn Barrow and Machine Company, of Jersey City, N. J., have recently completed one of the largest punching machines ever built in this country, of which an illustration is herewith presented. The company have heretofore made many powerful, quick-working punches, running without gears, but this is a triple gear machine, with only two shafts, working in the same way as the back gear of a lathe, while it is also adapted to run without gear, for quick punching, without shifting the belt. To run direct from the belt, the gear wheels are moved out of mesh by means of the hand wheel, when the fly wheel and main driving wheel are locked together, a change which can be made in less than two minutes, and the machine will then have a speed of one hundred revolutions a minute, and will punch 3 1/2-inch holes through 3/4-inch steel plate. When the gears are in mesh, the machine makes ten turns a minute, and will punch holes four inches or more in diameter through 1-inch steel plate. The machine has 50-inch gap, and the lower jaw is made to take a die ten inches in diameter, facilitating the heaviest punching work required by boiler makers and shipbuilders. The machine was built for Messrs. Wm. B. Pollock & Co., of Youngstown, Ohio, makers of the heavy steel converters employed at the Carnegie works. It weighs thirty-five tons, and occupies a floor space of 4 x 12 feet. The pressure obtained in the machine is about 400 tons.

A DISPATCH from Aalesund, Norway, April 24, says the American North Polar expedition under the command of Mr. Walter Wellman sailed to-day for the island of Spitzbergen on the steamer Ragnvold Jarl. The American aluminum boats which the expedition carries were greatly admired here for their beauty, strength and lightness. As the steamer left the quay the stars and stripes were hoisted at the

foremast head, and salutes were fired. All the shipping in the harbor was decorated with flags in honor of the Arctic explorers. A large fleet of small boats escorted the Ragnvold Jarl out of the harbor.

French Exploration in South Africa.

The Paris Geographical Society listened, at a recent meeting, to an account of a journey from the Cape of Good Hope to Lake Nyassa, by M. Edouard Foa. His address is given at length in the *Revue Francaise de l'etranger et des Colonies et Exploration Gazette Geographique*, and from this we take some of the most interesting facts presented.

The region north of the Zambesi, and extending from that river to Lake Nyassa, is the field of his exploration hitherto least known. The expedition was organized at Quilimane, situated in Mozambique on a northern mouth of the Zambesi, and from there it started up the river. The party consisted of four Europeans, including M. Foa, and twenty-eight Arabs. Upon their arrival at Nyassa, two of the Europeans and eleven of the Arabs had died from fevers or other diseases; the rest of the company was nearly prostrated from fatigue, privation and disease, but they had penetrated a region never before explored by Europeans.

This country between the Zambesi and Lake Nyassa covers an area of 68,312 square miles. The average altitude of the valley is about 1,100 feet above sea level. The surface is diversified and covered with rough vegetation. Numerous chains of mountains of an altitude varying from 1,800 to 6,000 feet traverse the territory. At their base are a great many streams, many of which are dry a part of the year. The climate is unhealthy along the rivers, but is more agreeable among the mountains. The average temperature is 95° Fah. in the day time and 68° at night. Some parts of the region the population is dense, in others it is very sparse. The natives are clothed with the bark of trees and skins. The Azimbas are a tribe with numerous branches, which are armed with bows and arrows, and their hair is adorned with feathers of many colors.

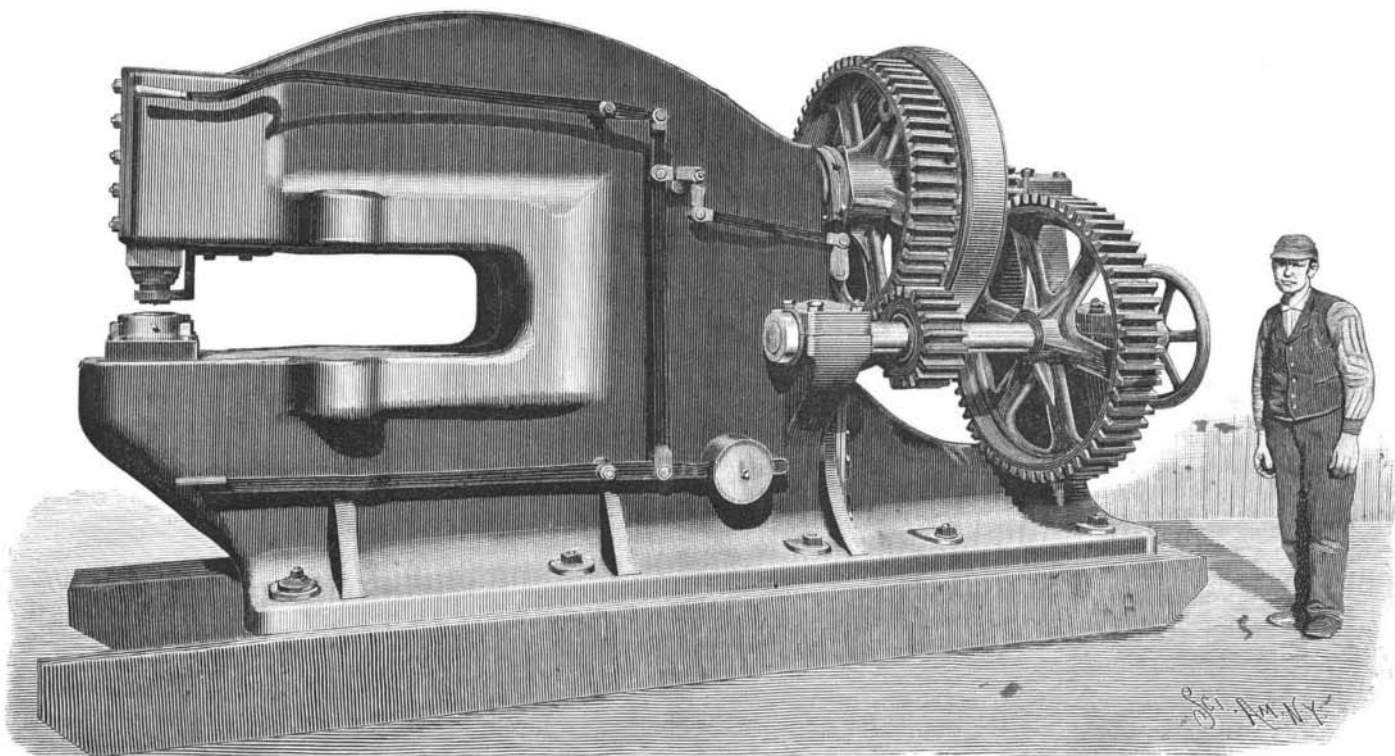
The natural resources of the country are undoubtedly great. Gold and other precious metals, coal, copper, and especially iron, are abundant. India rubber, gums, dye and cabinet woods, textile plants, skins, indigo and other products will one day swell the volume of commerce along the river.

M. Foa gave thrilling accounts of episodes of the expedition. For two and a half months he and a part of his men were separated from the others and held prisoners in a region devastated by famine and the incursions of a hostile tribe, by the swollen rivers, which from sometime dry fords were changed into impassable torrents.

The party lived entirely upon game, but suffered much from want of food, and three died of starvation, during this time. An elephant hunt and a lion chase were among the minor episodes described.

M. Foa dwelt upon the fact that the English are rapidly extending their protectorate in the African lake region.

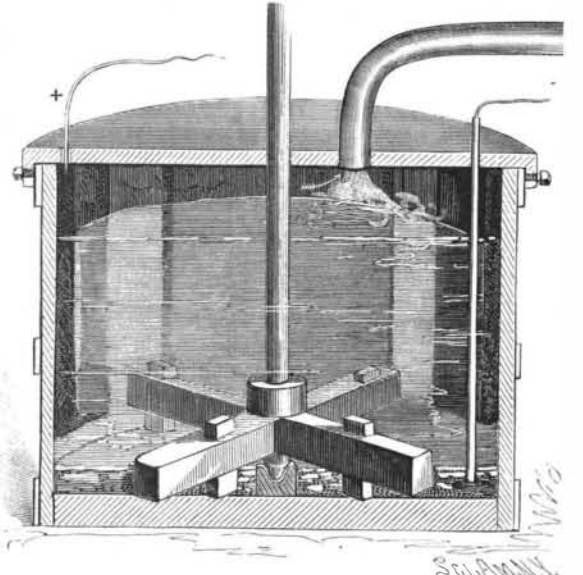
THE tide tables for the Atlantic coast of the United States, together with 207 stations on the Atlantic coast of British America, for the year 1895, published by the U. S. Coast and Geodetic Survey, are now ready for issue, and copies can be obtained at the agencies of the Survey in this city, or by addressing the office at Washington. Price, 25 cents.



A LARGE PUNCHING MACHINE.

A METHOD OF AND APPARATUS FOR AMALGAMATING ORES.

The freeing and amalgamating of gold or silver, either from free milling or base ores, by this method, is designed to save all the metals capable of being decomposed by an electric current from aqueous solution. The invention has been patented by Mr. Hubert F. Edwards, of Butte, Montana (box 910). The tank employed is preferably of wood, or of any material forming a poor conductor, to prevent the freed gold and silver from being plated on its sides, and in the bottom of the tank is a bath of quicksilver. The crushed ore or pulp with which the tank is charged is kept stirred by an agitator, con-



EDWARDS' ORE AMALGAMATING APPARATUS.

sisting of a central vertical shaft with radial blades and paddles, and from the top of the tank leads a pipe connecting with a suitable condenser, so that the vapors and gases generated during decomposition of its contents by the electric current may be condensed and used. The tank is lined with carbon or similar plates, whereby the liquid in the tank is connected with the positive pole of a battery, +, while the negative pole is connected by a wire, -, with the quicksilver in the tank bottom, the wire being led in through a suitable insulator.

According to the method of the inventor, the crushed ore or pulp supplied to the tank is mixed with some decomposing conducting chemical liquid or solution of some salt, as an aqueous solution of cyanide of potassium, which, when decomposed by the electric current, reacts on the metals united with the gold or silver, and is capable of dissolving the precious metals themselves, the solution being decomposed by the electric current to liberate the free gold and silver. The particles of silver and gold are amalgamated with the quicksilver at the bottom of the tank, and are thus charged negatively, the potassium also collecting at the negative pole, while the cyanogen separated combines with hydrogen to form prussic acid, the main part of which goes off as gas, hydroxide of iron being held in solution in the water. By this method the loss due to the flowering of the quicksilver is avoided, and the formation of calomel or other quicksilver salt is prevented.

Another Mississippi Bridge.

Mr. Huntington, president of the Southern Pacific Railroad, has signed a contract with the Phoenixville Bridge Company for the construction of a bridge for the company's line over the Mississippi near New Orleans. The bridge, which will cost five million dollars, will be ten thousand five hundred feet long, with a double track. It will be built on the cantilever principle. The object of its construction is to give the Southern Pacific an all-rail entrance into New Orleans.

Icebergs in the Southern Ocean.

If we may judge from reports from many vessels plying around Cape Horn, and between Europe and Australia, the Antarctic regions furnish a most extraordinary supply of icebergs.

A recent number of the *Nautical Magazine* gives accounts from the masters of nearly 200 ships sailing during the last year and a half, in which they report having met with ice, ice floes and icebergs extending over an area of apparently several millions of square miles, say from 40° to 60° south latitude and from 158° west longitude to 50° east longitude. The icebergs were of astonishing dimensions, some not higher than the sea level, others rising to a height of 1,500 feet, and in bulk from 1,000 feet square to 25 miles or more square. Many of the ships were exposed to great danger. Some of them, indeed, collided with icebergs and were lost; others were greatly damaged from the same cause. Ships would be sailing along, and being overtaken by a fog, would run into the bergs. Sometimes great bergs would be seen to capsize and the under part then became the top, appearing to be covered with earth and rocks, so that they looked like dry land. We will cite particulars of a single example of many equally narrow escapes:

After a voyage extending over 11 months, the full-rigged ship *Wellington*, Captain E. B. Broomhead, belonging to the Shaw, Savill & Albion Company, arrived at Plymouth Sound first week in April with 12,000 carcasses of mutton and a quantity of wool and grain from Picton, New Zealand. The *Wellington* left Picton on May 12, last year, and all went well until she was 1,000 miles from Cape Horn, when several terrible hurricanes were encountered. The seas which washed over the vessel were of tremendous force and caused considerable damage. One of them washed the wheel and the man steering across the deck, the sailor having his arm broken. The same sea dashed Captain Cowan, who was then in charge of the ship, to the deck, and his head was badly cut. The mate was thrown with such force against the side of the vessel that one of his legs was broken; it has since been amputated. Eleven days later, when the *Wellington* was 250 miles east of Cape Horn, a terrible and fatal accident occurred. At four a. m., in thick and stormy weather, the ship struck with terrific force a huge iceberg. The stem was carried away to within three feet of the water's edge, as well as the whole of the starboard bow and a part of the port bow. The bowsprit, foretopgallant mast, royal yards, freezing and galley funnels, and many other spars were also carried away, leaving the vessel almost a wreck. A good many of the crew were in their bunks, and two seamen, named Flemming and Wilson, were killed. At first it was feared that the ship would sink, and the crew prepared to launch the boats. When they got clear of the iceberg, however, it was found, much to the surprise of all, that the vessel was not leaking to any great extent, and the captain decided to make for Rio de Janeiro in order to effect temporary repairs. On arrival at Rio, 41 days after the accident, Captain Cowan returned to England and Captain Broomhead took charge of the vessel, the repairs to which were at once commenced. This was in the month of July, and on September 5 the revolution broke out. Work was at once stopped, owing to the fact that the workmen were pressed into active service. From that time until January last the repairs could be effected only at intervals, the men having to work in the midst of great danger, owing to the continual fighting between the opposing forces. In order to get out of the line of fire, the *Wellington* had to shift her berth in the harbor five times, and even then she had several narrow escapes. Three Nordenfolt shots passed through the ventilators of the ship, but fortunately very little damage was done. One of the crew who had deserted was drowned in trying to rejoin his vessel. Two apprentices were invalided home, but otherwise the crew maintained excellent health. On January 24 the *Wellington* set sail for England. Exceptionally fine weather prevailed until the English Channel was reached, 56 days from Rio, when strong easterly winds set in, and during the night Captain Broomhead put back from the Start for Plymouth to obtain the services of a tug to tow the ship to London. Although the cargo had been on board nearly 12 months, the mutton was in good condition, as the refrigerating apparatus was not seriously damaged.

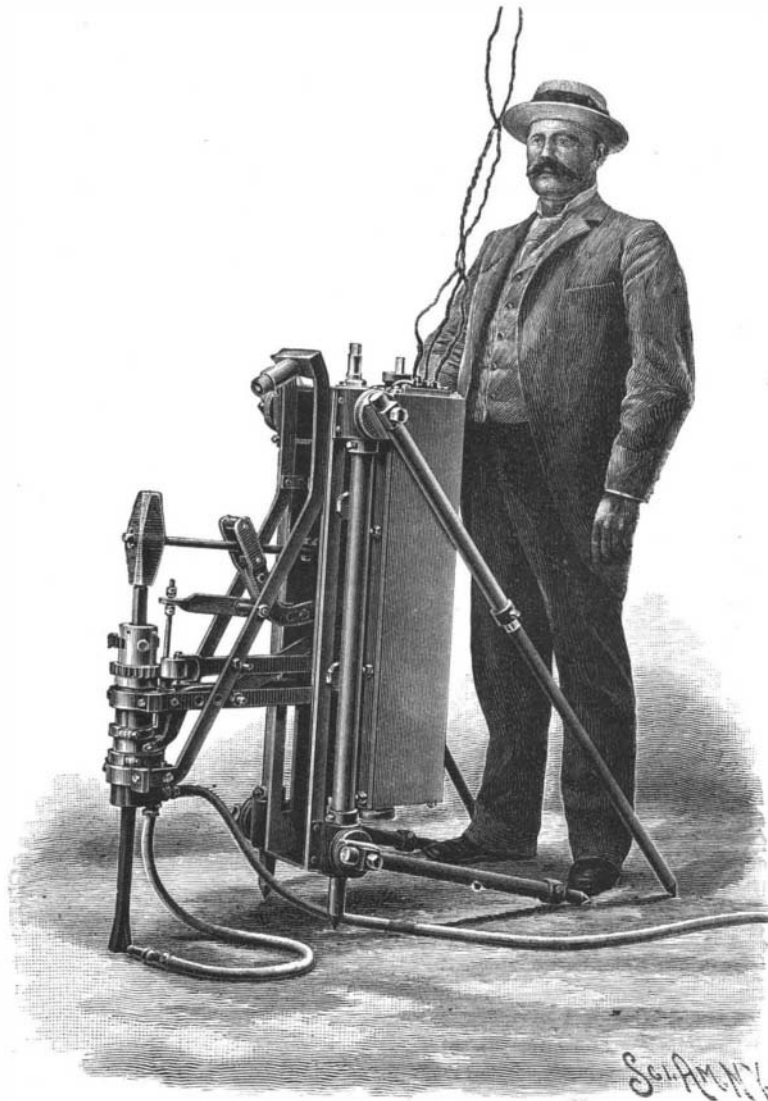
THE Mormon Tabernacle in Salt Lake City is the most perfect whispering gallery in the world. The dropping of a pin into a silk hat at one end of the huge structure is distinctly heard at the other end.

NOVEL ELECTRIC ROCK DRILL.

For conveying power into remote corners no more convenient means can be conceived than is afforded by electricity. As the current may readily be conveyed anywhere through a small and comparatively inexpensive cable, it is especially adapted for operating machinery for mining and quarrying. It is the invention of Mr. G. W. Pickett.

We illustrate a new rock drill operated by electricity, which seems to embody all the desirable points found in other drills, besides possessing the advantage of having greater portability on account of the use of electric cables in lieu of pipe or hose.

This machine, as will be seen by reference to the engraving, is very compact. It is arranged to deliver blows upon the drill rod in much the same manner as hand drills are operated by means of hammer; but in this case the motive power never tires. The hammer is operated by means of armatures or plungers drawn alternately into two oppositely arranged solenoids. The frame which carries the hammer is mounted upon a guide frame attached to the casing of the solenoid. The machine is adjustable, so that the drill can be operated either vertically or horizontally, or at any desired angle. The drill holder, which is carried by the adjustable frame, is arranged to rotate, and is furnished with a ratchet acted on by a pawl reciprocated by



NEW ELECTRIC ROCK DRILL.

means of the hammer-operating lever. The same movement operates a pawl which turns a nut on the feed screw and feeds the drill forward.

In the ends of the solenoids are buffers to prevent too great shock to the machine should the resistance prove too light to absorb all the energy developed by the blow of the hammer, or should it be accidentally set in operation when not in position for doing work. The connection between the hammer-operating lever and the hammer arm is not positive, but permits of a certain amount of play between the hammer arm and the lever, and a buffer is provided for arresting the upward motion of the hammer. The current is automatically shifted from one solenoid to the other, so that the drill after being started operates continuously and automatically until a new adjustment is required. In this drill there are no small, easily disarranged, delicate parts. There is no chance for undue wear, and its construction is such that should any part give out, it can be replaced by such mechanics as are found in mining and quarrying districts.

Patents covering this machine have been issued in the United States and various foreign countries to Mr. Samuel Lesem, whose offices are in the Mining and Exchange building, Denver, Colorado.

CANON Wilberforce, in a recent interview published in the *Westminster Gazette*, contends that the lower animals are immortal, and uses his belief as an argument against the establishment of a Pasteur institute in England.

Large Scale Photographic Maps of the Moon.

In 1890 Dr. Langley sent out a circular relative to the making of a photographic map of the moon. Very successful experiments in enlarging the negatives made at the Lick Observatory have shown that it is perfectly practicable to produce such a map on a large scale, by directly enlarging the focal negatives made at Mount Hamilton. Some of the features of the moon, as crater pits, are better seen in enlargements than in any other way. An atlas on the scale of 3 feet to the diameter of the moon would be the best for ordinary use, while one with a diameter of 10 feet would be on the largest scale, which presents a distinct advantage. "It is hoped," says Prof. E. S. Holden, "that the 3 foot and 10 foot atlases will be made in the near future. At any rate, the scientific problem is now solved, and only the financial one remains."

Improved Hospitals.

A lecture was recently given before the Society of Architects in Berlin, by Herr Boettger, on the present state of the science of hospital planning, which has much interest. Says the *The American Architect*:

As nearly every summer sees some important progress of sanitarians or physicians, at which hospital construction is discussed, it is not strange that ideas on the subject are brought forward, tested, and abandoned, or developed further, in rapid succession, and the hospitals of this year differ materially from those of even three or four years ago. According to Herr Boettger, while there is very far from being unanimity among experts on many points of hospital design, it is generally agreed that, for large establishments, with more than one hundred beds, the system of wards connected by corridors is to be condemned, and that isolated pavilions should be exclusively employed. It has usually been considered that, with isolated pavilions, the cost of supervision and service is much greater than where the wards are connected by corridors, but Herr Boettger says that, if the buildings are carefully grouped around the administration offices, this is not the case. The theory once prevalent, that hospitals for cities must be at or near the center of population, is also becoming obsolete. Great improvements have been made in the rapidity and comfort of ambulance service, and the most recent hospitals are built far enough outside the cities to secure fresh air. The immense new establishment at Hamburg, which comprises eighty-one separate buildings, is about five miles from the city, and so careful are hospital directors to avoid what Herr Boettger calls the defiled air of the great towns, that the direction of the prevailing wind is studied, so that, even at five miles distance, the city air may have little chance as possible of reaching the patients.

Cellars are now abandoned for the pavilions of large hospitals, as they have long been for small ones. No use can or should be made of them, and it is much better to allow the air to blow freely through under the first floor. The best number of patients for a ward in general hospitals is generally agreed to be thirty, with twenty as the maximum for wards containing certain classes of patients. To secure the best effects of sun and air, the long axis of the wards should run north and south, instead of east and west, as in many of the older Continental hospitals. This gives sun on both sides of the room during some part of the day, and allows the "day room," or "sunning room," which is now an indispensable part of every large hospital ward, to be placed at the south end, where it does not shade any windows. Roofs should be flat, without air spaces between the rafters and ceiling, and covered with "wood cement," or similar material. Opinions still vary as to the best flooring. Some still prefer wood, but Herr Boettger considers that a pavement of smooth concrete, or Mettlach tiles, is much better, if suitable provision can be made for keeping it warm. The best material for walls is now agreed to be brick. Probably it is intended that they should be built hollow, for Herr Boettger continues that the inside face should be laid as smoothly as possible, with very close joints, and painted in oil to a height of seven feet above the floor, or else covered to that height with tiles. For hospitals for infectious diseases, the newest idea, which is certainly a good one, is to provide, in the hospital grounds, a number of monolith platforms of concrete, of suitable size, on which temporary structures can be erected at any time, either in winter or summer, in a few days, or even in a few hours, and cleared away as quickly after the exigency is past.

THE United States produce annually forty-six million tons of hay.